REMARKS

At the Examiners suggestion, Claim 1 has been amended to recite "selected from the group consisting of". No new matter has been added.

The Rejections Under 35 USC § 112

It is believed that the amendment to claim 1 renders the rejection moot. Thus, removal of the rejection under 35 USC § 112 is respectfully requested.

The Rejections Under 35 USC § 103

The claims stand rejected as allegedly unpatentable over a) Fujiwara (alone or in view of Hiraiwa) and in view of Kyoto and optionally Moore and also over b) Hiraiwa in view of Fujiwara and Kyoto and optionally Moore. In addition, the claims stand rejected as allegedly unpatentable over Hiraiwa in view of Fujiwara, and Kyoto (and optionally Moore).

Applicants disagree with the rejections. One of ordinary skill in the art would not be motivated to combine the teachings of the references as alleged and if they were combined would not arrive at the invention.

The Examiner alleges (at page 4 of the Office Action) that "...the references teach both cutting and molding." However, the references do not teach removal of a specific portion of the ingot. Simply cutting or molding an ingot without removal of the surface has disadvantages as noted in paragraph [0033] and [0034] of the specification,

> "an ingot as vitrified has a distribution of fluorine concentration. Direct molding and annealing of this ingot almost fails to produce an optically homogeneous article.
>
> If the fluorine concentration of quartz glass differs, the strain point and annealing point thereof also differ. Then a single ingot includes portions which are effectively annealed and portions which are not effectively annealed under preset annealing conditions, and even portions which become more heterogeneous by annealing. "

At page 4 of the Office Action, the Examiner alleges that "...changing the shape or size of something is not invention..." Step e) of the present claims requires removal of a specific amount of a specific portion of the ingot (i.e. in an amount of at least 5% of the outer diameter and the opposite ends of the ingot each in an amount of at least 2.5% of the longitudinal length and at least 5% in total). The removal of the surface not only changes the size and shape of the ingot but it also significantly changes the properties of the ingot.

As noted in the specification at page 7 and 8, when the surface portion of the ingot, which has a fluorine concentration largely different from that of the central portion of the ingot, is removed from the ingot, this surface-removed ingot (to be shaped) has a minimized distribution of fluorine concentration so that the effect of annealing is exerted throughout the ingot. Thus, removal of the surface is highly advantageous since the birefringence of the ingot is smaller in proximity to the center. Removal affects not only the desired birefringence but also the refractive index distribution, the transmittance and the transmittance distribution. Thus, the invention is not just "...changing the shape or size of something..." as the Examiner alleges.

The cited references do not give a hint as to these desirable properties. The only discussion in Fujiwara of the treatment of the ingot after heating and vitryifying is found at col. 13, lines 35-39 (i.e.,"A member having a desired thickness was cut from the 260-mm diameter ingot obtained by the above method, thereby obtaining a measurement sample for optical characteristics. "). Fujiwara (or any of the other references) does not teach or suggest the removal of the surface portion of the ingot prior to molding (i.e., step e). Fujiwara is particularly silent regarding removing the outer periphery of the ingot in an amount of at least 5% of the outer diameter and the opposite ends of the ingot each in an amount of at least 2.5% of the longitudinal length and at least 5% in total.

At page 5, lines 1-2 of the Office Action the Examiner disagrees with Applicants position that Fujiwara does not teach the four claimed gases (in step a). At col. 7, line 59 to Col. 8 line 3 Fujiwara discusses the gases injected from the second tube (502). Again at Col. 8, lines 51-52, Fujiwara discloses the type of gas injected from each tube. Fluoride is not disclosed. The Examiner points to Col.9 lines 40-43. The passage relates to silicon compounds used as a material in the first and second manufacturing methods. Nothing in that passage would lead one skilled in the art to feed a fluorine gas to the feeding reactant zone in Step a). Fujiwara explicitly identifies the specific gasses in the atmosphere of the first heating stage (corresponding to step a). Fluoride is only disclosed (Col. 8, lines 55-57) with respect to the doping process corresponding to step c) of the present claims. Thus, Fujiwara does not teach or suggest a silica-forming reactant gas comprising alkoxysilane, hydrogen gas, oxygen gas and a fluorine compound gas selected from SiF_4, CHF_3 and CF_4.

As previously mentioned, Fujiwara does not identify a fluorine atmosphere in the third heating stage which corresponds to step d of the present invention. At page 5 of the Office Action the Examiner states "it does not matter that Fujiwara does not teach sintering in fluorine ..." and points to the Office Action of 19 August 2005 to explain why it would have been obvious in view of the combination of references. The Examiner here relies on the teachings of Kyoto. Kyoto teaches a VAD process where fluorine is added in the vitrifying step. However, Kyoto also teaches that when the temperature with SiF_4 "exceeds 1,400°C, the bubbles tend to form in the glass perform." See column 3, lines 63 to column 4, line 1, and Figure 3. Additionally, Examples 1 and 2 in Kyoto teach heating to 1,100°C with SiF_4 and Example 3 teaches heating to 1,350°C with SiF_4. Heating to higher temperatures occurs in a helium atmosphere. Thus, Kyoto is teaching away from step d) of the present claims. One of ordinary skill in the art combining Kyoto with Fujiwara would not be motivated to vitrify as claimed herein, i.e., at 1,500°C to 1,700°C in a fluorine compound gas-containing atmosphere, especially since Kyoto teaches away from vitrifying at such high temperatures to avoid bubble formation. Furthermore, Haraiwa, Yamagata and Moore also do not teach vitrifying at 1,500°C to 1,700°C in a fluorine compound gas-containing atmosphere. Thus, no combination of references teaches step d) of the present invention.

As pointed out, Fujiwara is lacking any teaching, or suggestion or motivation that would lead a skilled worker to arrive at step a) of the present invention. Fujuwara is also lacking any teaching, or suggestion or motivation that would lead a skilled worker to arrive at step d of the present invention. Finally, Fujiwara does not teach, suggest or motivate a skilled worker to arrive step e of the present invention.

Hiraiwa fails to make up for the deficiencies of Fujiwara. Hiraiwa fails to teach the introduction of fluorine gas at the start up (i.e., step a). Additionally, Haraiwa (as noted above) fails to teach the introduction of fluorine gas at step d. Also like Fujiwara, Hiraiwa is silent regarding the treatment of the ingot prior to molding (i.e., step e). No mention or suggestion is made to remove the surface portion of the ingot. The reference is particularly silent regarding removing the outer periphery of the ingot in an amount of at least 5% of the outer diameter and the opposite ends of the ingot each in an amount of at least 2.5% of the longitudinal length and at least 5% in total.

Like Hiraiwa and Fujiwara above, Kyoto does not teach or suggest the introduction of fluorine gas at start up (i.e., step a). Not only does Kyoto not teach step d of the present invention but as previously discussed, Kyoto teaches away from step d. With respect to step e, like Fujiwara and Hiraiwa above, Kyoto is silent. There is no mention or discussion at all of the treatment of the ingot after vitrification. Thus, Kyoto is silent regarding step a, step d and step e of the present invention.

Moore teaches sintering at 1,480°C. The claims herein recite vitrifying occurs at 1,500°C to 1,700°C in a fluorine compound gas-containing atmosphere. Also, like the references discussed above, a step corresponding to step e of the present claims is not taught or suggested by Moore.

Yamagata does not disclose the introduction of fluorine gas to the starting material gas (i.e. step a). Yamagata is entirely lacking teaching corresponding to step d, e and f of the present invention. Thus, this reference does not cure the deficiencies of the references discussed above.

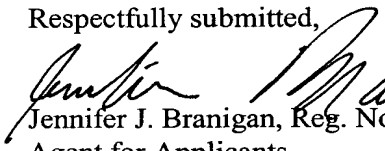
Thus, even a combination of the teachings of Hiraiwa, Fujiwara, Yamagata, Kyoto and Moore would not lead one skilled in the art to arrive at the present invention. The combination of references, as cited by the Examiner, cannot render the present invention unpatentable because there is no teaching or suggestion of the features of the present invention within these references and there is no motivation to make the modifications required to arrive at Applicants' invention. Therefore, in considering the prior art as a whole, one of skill in the art would not be motivated to make the combination, as suggested by the Examiner.

Thus, Applicants' respectfully request that the rejections under 35 U.S.C. § 103 be withdrawn.

Reconsideration is respectfully requested.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,



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Date: **19 October 2006**